UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/775,838	02/01/2001	Toshio Hata	299002051900	1157

25226 7590 11/19/2003

MORRISON & FOERSTER LLP
755 PAGE MILL RD
PALO ALTO, CA 94304-1018

EXAMINER	
LE, THAO X	

ART UNIT	PAPER NUMBER
2814	

DATE MAILED: 11/19/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application N .	Applicant(s)	
	09/775,838	HATA ET AL.	
	Examiner	Art Unit	
	Thao X Le	2814	

-- The MAILING DATE of this c mmunication appears on the cov r sh et with the correspondenc address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 September 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11 and 13-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11 and 13-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Acknowledgement

1. Applicant's cancellation of claim 12 in Paper No. 0903 is acknowledged.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claim 1-4, 6-11, 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6242761 to Fujimoto et al in view of US 6130446 to Takeuchi et al.

Regarding to claim 1, Fujimoto discloses in fig. 1 a gallium nitride (GaN) compound semiconductor light emission device comprising: a substrate 101, a n-type electrode region 104/103 comprising an n-type transmissive electrode 130, a GaN compound semiconductor

multiplayer structure including active layer 107, a p-type electrode region 114/113 comprising a p-type transmissive electrode 131, wherein the n-type transmissive electrode and p-type transmissive electrode are thin film so as to be substantially transparent.

But Fujimoto does not expressly disclose the n-type and p-type transmissive electrodes are of a thickness of 30nm or less.

However, Fujimoto discloses the n-type and p-type transmissive electrodes are multiplayer having various thickness, column 6 line 66-67 and column 7 lines 25-30. In addition, Takeuchi discloses the n-type and p-type transmissive electrodes Ni and Au are used as a transparent metal film electrode having different thickness including less than 30nm, see Table 1, column 7 line 30-33 and the transparency can be adjusted by decreasing the thickness, column 1 lines 39-45. Accordingly, it would have been obvious to one of ordinary skill in art to use the electrode thickness teaching of Takeuchi in Fujimoto GaN compound in the range as claimed, because it has been held that where the general conditions of the claims are discloses in the prior art, it is not inventive to discover the optimum or workable range by routine experimentation. See In re Aller, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955), and providing electrode having good ohmic contact with an n-type semiconductor without requiring heat treatment as taught by Takeuchi, see Abstract.

Regarding to claim 2, Fujimoto discloses a GaN compound light-emitting diode (LED), wherein the p-type transmissive electrode 131 and the n-type transmissive electrode 130 transmit light, which is generated in the active layer 107 and reflected from the substrate so that light exits the light emission device, fig. 1.

Regarding to claim 3-4, 16 Fujimoto discloses a GaN compound LED, wherein the n-type transmissive electrode is located outside and is formed at least partially or completely around a circumference of the p-type transmissive electrode, fig. 1. The fig. 1 is the side view of the device and the top view (not shown) would have shown the surrounding structure as claimed, because of the inherency of the structure.

Regarding to claim 6-8, Fujimoto discloses a GaN compound LED wherein the n-type and p-type electrode region further comprises an n-type and p-type pad electrode, column 7 line 37-41, are provided substantially along one side of a GaN compound, and the p-type pad is formed in the vicinity of the center of the emitting face of the gallium nitride compound, fig. 1

Regarding to claim 9, Fujimoto discloses a GaN compound LED wherein the n-type transmissive electrode comprises at least one of the thin metal film, column 7 lines 3-4.

Regarding to claim 10, Fujimoto teaches a gallium nitride compound semiconductor LED wherein the n-type pad electrode is of a type, which realizes a Schottky contact.

Regarding to claim 11, Fujimoto teaches a gallium nitride compound semiconductor LED device wherein the n-type pad electrode comprises an alloy of Au, column 7 lines 38-39.

Regarding to claim 16, Fujimoto discloses the GaN compound semiconductor LED wherein the n-type transmissive electrode is formed completely around the circumference of the p-type transmissive electrode. The top view of fig. 1 would show the electrode 130 surrounding the p-type electrode 131. Such view would be comparable to the fig. 4 of the instant application.

4. Claims 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5739554 to Edmond et al. in view of US 6130446 to Takeuchi et al.

Regarding to claim 13, Edmond discloses in fig. 2 a GaN compound semiconductor LED comprising: a conductive substrate 41, a n-type electrode region 41/43 comprising an n-type transmissive electrode 51/55/57, a non-conductive buffer layer 42 provided on the substrate 41, a GaN compound semiconductor multiplayer structure including active layer 46 provided on the buffer layer 42, and a p-type electrode region 50 comprising a p-type transmissive electrode 53 provided on the GaN compound semiconductor multiplayer structure, wherein the n-type transmissive electrode 51/55/57 is formed on the lower face of the substrate 41, a side face of the buffer layer 42, and a side face of the n-type GaN compound semiconductor multiplayer structure in a region neighboring the buffer layer.

But Edmond does not expressly disclose the n-type and p-type transmissive electrodes are of a thickness of 30nm or less.

However, Takeuchi discloses the n-type and p-type transmissive electrodes Ni and Au are used as a transparent metal film electrode having different thickness including less than 30nm, see Table 1, column 7 line 30-33 and the transparency can be adjusted by decreasing the thickness, column 1 lines 39-45. Accordingly, it would have been obvious to one of ordinary skill in art to use the electrode thickness teaching of Takeuchi in Fujimoto GaN compound in the range as claimed, because it has been held that where the general conditions of the claims are discloses in the prior art, it is not inventive to discover the optimum or workable range by routine experimentation. See In re Aller, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955), and providing electrode having good ohmic contact with an n-type semiconductor without requiring heat treatment as taught by Takeuchi, see Abstract.

5. Claim 5 rejected under 35 U.S.C. 103(a) as being unpatentable over US 6242761 to Fujimoto et al. and US 6130446 to Takeuchi et al. and further in view of US 5369289 to Tamaki et al.

Regarding to claim 5, Fujimoto discloses a gallium nitride (GaN) compound light-emitting diode (LED) wherein the GaN compound semiconductor multiplayer structure includes a buffer layer 102 and an n-type GaN transmissive electrode 130/140.

But Fujimoto does not expressly disclose a gallium nitride (GaN) compound light-emitting diode (LED) wherein n-type transmissive electrode is formed on a side of the substrate, a side face of the buffer layer, and a side face of the n-type GaN compound semiconductor layer in a region neighbor the buffer layer.

However, Tamaki reference discloses the a gallium nitride (GaN) compound light-emitting diode (LED) having multiple layer structure, fig. 11-15, wherein n-type transmissive electrode 8 is formed on a side of the substrate 1, a side face of the buffer layer 2, and a side face of the n-type GaN compound semiconductor layer 3 in a region neighbor the buffer layer. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the transmissive electrode 8 teaching of Tamaki to replace the n-type GaN transmissive electrode 130/140 of Fujimoto, because it would have resulted in an improvement of light emission efficiency as taught by Tamaki, column 7 line 9-12.

6. Claims 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over by US 5739554 to Edmond et al. in view of US 5977565 to Ishikawa et al. and US 6130446 to Takeuchi et al.

Regarding to claims 14, 15, Edmond discloses in fig. 2 a GaN compound semiconductor LED comprising: a substrate 41, a n-type electrode region 41/43 comprising an n-type transmissive electrode 51/55/57, a buffer layer 42 provided on the substrate 41, a GaN compound semiconductor multiplayer structure including active layer 46 provided on the buffer layer 42, and a p-type electrode region 50 comprising a p-type transmissive electrode 53 provided on the GaN compound semiconductor multiplayer structure, wherein the n-type transmissive electrode 51/55/57 is formed on the lower face of the substrate 41, a side face of the buffer layer 42, and a side face of the n-type GaN compound semiconductor multiplayer structure in a region neighboring the buffer layer.

However, Edmond does not expressly disclose the n-type transmissive electrode comprises an oxide semiconductor.

But, Ishikawa reference discloses the LED in fig.2 (a) wherein the electrode 107 comprises ITO, SnO_2, or translucent Ni or Au, column 6 lines 63-67. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to combine the teaching of transparent electrode teaching of Ishikawa to replace the n-type electrode of Fujimoto, because it would have increased an area for the emitted light as taught by Ishikawa, column 7 lines 1-2. Furthermore, it would have been obvious to one of ordinary skill in the art to use oxide semiconductor electrode teaching of Ishikawa the replace the Edmond's electrode, because such material substitution would have been considered a mere substitution of art-recognized equivalent values.

With respect to the thickness, see discussion in claim 13.

Response to Arguments

7. Applicant's arguments filed 09/24/03 have been fully considered but they are not persuasive. In response the Applicant's argument that the Office Action mailed on 06/23/03 failed to provide the motivation, other than the optimal working range, for the combination of Fujimoto and Takeuchi. This is not persuasive because the applicant has not established the criticality of the thickness stated and since these thicknesses are in common use in similar devices in the art, it would have been obvious to one of ordinary skill in the art to use these values in the device of the thickness as claimed. Where patentability is said to be based upon particular chosen dimension or upon another variable recited in a claim, the applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thao X Le whose telephone number is 703-306-0208. The examiner can normally be reached on M-F from 8:00 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M Fahmy can be reached on 703-308-4918. The fax phone number for the organization where this application or proceeding is assigned is 703-308-7722.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Thao X. Le
06 Nov. 2003